

REMARKS

Claims 1-32 are under consideration. Claims 33-58 were withdrawn from consideration by the Examiner, presumably due to finality of the Restriction Requirement presented in an earlier Office Action dated March 30, 2005.

The indication of allowability for Claim 14 is again noted with sincere appreciation. The novelty of Claims 2-13 and 15-32 is also noted, again with sincere appreciation.

The above amendments are submitted to place the claims in condition for allowance or at least in better condition for appeal. Support for the amendment to Claim 1 is found in the Specification at Page 9, paragraph 0032.

Herein, the Office Action of January 31, 2006, is sometimes referred to as "the present Office Action," while the Office Action of September 12, 2005, is sometimes referred to as "the immediately previous Office Action," and the Office Action of March 30, 2005, is sometimes referred to as "the first Office Action." The Office Actions of March 30, 2005, and September 12, 2005, are sometimes referred to herein collectively as "both previous Office Actions."

Rejection under 35 U.S.C. 112, first paragraph

Claim 3 is rejected under section 112, first paragraph, as not being enabling for 8 mole %. Claim 3 has been amended to recite 10 mole %, the value originally present in this claim. Additional support for the 10 mole % value is found at least at Page 10, paragraph 0037 of the Specification. It is submitted that Claim 3 as amended is enabled, and that this rejection should be reconsidered and withdrawn.

Rejection under 35 U.S.C. 112, second paragraph

Claims 6, 15, and 27 remain rejected under section 112, second paragraph, as allegedly indefinite. The Examiner supports this rejection by asserting that the word "partially" in the phrase "partially halogenated aluminosiloxane" is a relative term. This rejection is again respectfully traversed. Guidance regarding relative terminology is provided in the M.P.E.P., which states in § 2173.05(c) that

The fact that claim language, including terms of degree, may not be precise, does **not** automatically render the claim indefinite under 35 U.S.C. 112,

second paragraph. *Seattle Box Co. v. Industrial Crating & Packing, Inc.*, 731 F.2d 818, 221 U.S.P.Q. 568 (Fed. Cir. 1984). Acceptability of the claim language depends on whether one of ordinary skill in the art would understand what is claimed, in light of the specification. (Emphasis added.)

It is Applicants' position that the term "partially" in the phrase "partially halogenated aluminoxane" is not indefinite. One of ordinary skill in the art would understand what is claimed, particularly in light of the Specification. As brought out in the Specification pursuant to this invention, partially halogenated aluminoxane compositions typically have considerable stability under inert, anhydrous conditions, while maintaining their solubility in hydrocarbon solvents (Page 2, paragraph 0008). Applicants point out that fully halogenated aluminoxanes become insoluble in hydrocarbon solvents. Thus, the language "partially halogenated aluminoxane" indicates that some but certainly not all of the aluminoxane is halogenated. Furthermore, Claims 6, 15, and 27 ultimately depend from independent Claim 2, which states that the amount of halogen atoms present is "in the range of about 0.5 mole % to about 15 mole % relative to aluminum atoms." This clearly provides metes and bounds to these claims.

Thus, it is submitted that Claims 6, 15, and 27 do particularly point out and distinctly claim subject matter the Applicants regard as the invention, and therefore that this rejection continues to fail to establish a *prima facie* case of indefiniteness and should be reconsidered and withdrawn.

Rejection under 35 U.S.C. 102(b)

Claim 1 remains rejected under § 102(b) as anticipated by Kioka et al. (U.S. 6,063,726). This rejection is again respectfully traversed. Claim 1 is deemed novel over Kioka et al.

A clarification is felt necessary, as Page 3 of the present Office Action incorrectly characterizes Applicants' argument in the Response to the immediately previous Office Action regarding this rejection. While it was stated that Kioka et al. does not use a halogenated aluminoxane where $a = 30$ and $b = 3$, this was not the point of the argument therein. The point being made in that argument was that there is no disclosure in Kioka et al. that any particular relative amount of halogen to aluminum is more or less beneficial. There is nothing in Kioka et al. to lead one to choose $a = 30$ and $b = 3$ from hundreds of possible ranges and values. The Examiner is using hindsight to choose values for a and b which conveniently fall within the range of Applicants' claims. From this, it appears that the

Examiner may be trying to say that the present invention is inherently anticipated. Inherency has certain requirements. The inherent feature *must* be present in the prior art: "Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing *may* result from a given set of circumstances is not sufficient." *In re Oelrich*, 666 F.2d 578, 581, 212 U.S.P.Q. (BNA) 323, 326 (1981), quoting *Hansgirg v. Kemmer*, 102 F.2d 212, 214, 40 U.S.P.Q. 665, 667 (C.C.P.A. 1939). Optimal conditions are not considered to be inherent in the prior art. *In re Rijckaert*, 9 F.3d 1531, 1534, 28 U.S.P.Q.2d 1955, 1957 (Fed. Cir. 1993). In other words, the inherent property must be present all the time, not just by selecting certain (optimal) unspecified conditions from the generalized teachings of the cited reference. The rules of inherency show that present Claim 1 is not inherently anticipated because the halogen content in present Claim 1 is one possibility amongst many taught by Kioka et al., and thus this rejection does not meet the standard for inherent anticipation.

It is well understood by the undersigned that working examples are not required in anticipation rejections. However, in genus-species situations it is sometimes untrue that "all that is needed is that the cited prior [art] anticipates the claimed invention." In order to anticipate the claims, the claimed subject matter must be disclosed in the reference with "sufficient specificity to constitute an anticipation under the statute" (M.P.E.P. § 2131.03 II). Applicants' position regarding the genus-species rejection is that Kioka et al. does not disclose halogenated aluminoxanes having the amount of halogen of present Claim 1 with sufficient specificity.

It is also well understood by the undersigned that unexpected results are normally irrelevant to anticipation rejections. However, one situation in which unexpected results are relevant in an anticipation rejection is in a genus-species situation in which the prior art shows a range which touches, overlaps, or is within the claimed range, but no specific examples falling within the claimed range are disclosed (M.P.E.P. § 2131.03 II). Kioka et al. discloses an aluminoxane having a halogen content in a range which encompasses the claimed range, and thus unexpected results are relevant in overcoming this rejection. As stated in the Response to the immediately previous Office Action, the range disclosed in Kioka et al. for the amount of halogen in the aluminoxane is quite broad, from 0 mole % to 97 mole %, excluding only 98 to 100 mole % halogen relative to aluminum. In contrast, Claim 1 of the present Application is directed to a very narrow range, about 0.5 mole % to about 10 mole % halogen relative to aluminum, thereby excluding about 11 to 100 mole % halogen relative to aluminum, as well as less than about 0.5 mole % halogen relative to aluminum. Thus, it should be clear that Applicants continue to assert that nowhere does Kioka et al. select or

suggest an amount of halogen relative to aluminum in the range of about 0.005 to about 0.10. The broad range of Kioka et al. may encompass the range of present Claim 1, but alone it is not enough for an anticipation rejection in a genus-species situation.

More importantly, the compositions of the presently claimed invention are chemically different from those of Kioka et al., and the genus-species rejections are moot. Applicants have repeated the synthesis of the halogenated aluminoxanes of Example 31 of Kioka et al., which were made by hydrolyzing dimethylaluminum chloride with or without trimethylaluminum. These halogenated aluminoxanes of Kioka et al. were employed in polymerizations under conditions similar to those in Examples 25-27 of the present Application, and their activity was compared to that of other aluminoxanes, including those of the presently claimed invention. The description of these experiments is attached as Exhibit B. If required, a Declaration regarding these experiments can be supplied. In the polymerizations, the systems using halogenated aluminoxanes of Kioka et al. showed almost no activity, while the remainder, in which the halogenated aluminoxanes were made by halogenating an already-formed aluminoxane, showed reasonable activity. The compositions in the present claims are made from a halogenation agent and an aluminoxane, while the halogenated aluminoxanes of Kioka et al. are made by hydrolyzing a trialkylaluminum compound and/or a dialkyl aluminum monohalide (column 10, lines 1-11). The polymerization results demonstrate that the halogenated aluminoxanes of Kioka et al. are in fact different substances from those of the presently claimed invention. A plot showing a portion of the ^1H NMR spectra of four of the aluminoxanes synthesized in Exhibit B is also included. The ^1H NMR spectra of methylaluminoxane and of the fluorinated aluminoxane of the present invention made by reacting methylaluminoxane with a fluorination agent each show a sharp peak with broad shoulders. The ^1H NMR spectra for the chlorinated aluminoxane with 50 mole percent chlorine and for the halogenated aluminoxane of Kioka et al. each show a sharp peak; the broad shoulders seen in the spectra of the fluorinated aluminoxane of the present invention are absent. Thus, the haloaluminoxanes of present Claim 1 are novel over the cited reference.

Kioka et al. does not anticipate present Claim 1. On the basis of the foregoing, it is respectfully requested that the rejection of Claim 1 over Kioka et al. under § 102(b) be reconsidered and withdrawn.

Rejection under 35 U.S.C. 103(a)

Claims 1-13 and 15-32 remain rejected under section 103(a) as allegedly obvious over

Kioka et al. This rejection is again respectfully traversed.

It is stated on Page 4 of the present Office Action that there is no need to modify Kioka's teaching to come up with the instant claims because the amount of halogen relative to aluminum in the range of Kioka's haloaluminumoxane overlaps with the range of the instant claims. It is respectfully submitted that the Examiner is incorrect insofar as the legal requirements for an obviousness rejection. Referring again to the fact that this appears to be a genus-species situation, a motivation or suggestion to select the species is still required. The M.P.E.P. is instructive:

A 35 U.S.C. 102/103 combination rejection is permitted if it is unclear if the reference teaches the range with "sufficient specificity." The examiner must, in this case, provide reasons for anticipation *as well as a motivational statement regarding obviousness*. M.P.E.P. § 2131.03 II (Emphasis added).

The fact that a claimed species or subgenus is encompassed by a prior art genus is not sufficient by itself to establish a prima facie case of obviousness. *In re Baird*, 16 F.3d 380, 382, 29 U.S.P.Q.2d 1550, 1552 (Fed. Cir. 1994). M.P.E.P. § 2144.08 II.

In addition, the statement on Page 4 of the present Office Action that "There is no better motivation than the direct teaching of the cited prior art" is not the standard for obviousness, nor does this statement provide or point to any motivation for selecting any particular range within the broad range disclosed by Kioka. No motivation or suggestion to modify has been provided in the present Office Action, nor was any motivation or suggestion to modify provided in the immediately previous Office Action, and thus there is no *prima facie* case of obviousness.

Applicants object to the characterization of the results of Tables 2 and 3 in the present Application as "inferior or same or little increase [in] catalytic activities." In Table 3, only one result is not clearly better than the nonhalogenated aluminumoxane, and that one result is actually between the two comparative results, so the catalytic activity with this halogenated species is arguably the same as, rather than inferior to, the activity seen with the nonhalogenated aluminumoxanes. In Table 2, the catalytic activity with the fluorinated aluminumoxanes was the same as or better than that with the nonhalogenated aluminumoxanes in ten of the twelve instances listed. In the remaining two instances, the catalytic activity was 1000 kg PE/g Zr/hr, which is not markedly less than the 1100 kg PE/g Zr/hr activity observed for the nonhalogenated aluminumoxanes. While the increase in catalytic activity may be modest, the comparable catalytic activity, especially coupled with the increased stability, is an

advantage and an unexpected result. In this connection, it is pointed out that there is no statutory requirement that an invention must be better than what is known in the prior art, only that the invention be novel and nonobvious. *Monarch Knitting Mach. Corp. v. Sulzer Morat GmbH*, 139 F.3d 877, 881, 45 U.S.P.Q.2d 1977, 1981 (Fed. Cir. 1998). Further, at the bottom of Page 4 of the present Office Action, the Examiner states that

Applicants need to show unexpected results, such as much improved activity, for all halogens, F, Cl, Br, and I in the whole halogen mole% range of the instant claims including both of the low end and the high end of the claimed range. (Emphasis in *original*.)

Applicants submit that this is overreaching. None of the rejected claims are directed to iodine. Thus, the scope of unexpected results needed to be shown by Applicants is not as all-encompassing as the Examiner insists. Further, the results must be only *unexpected*, not "much improved." *Monarch Knitting*, *supra*.

Unexpected results can overcome obviousness rejections. As described in the Response to the immediately previous Office Action, the unexpected results in the present invention include the increased stability of the haloaluminoxanes of the present claims against gel formation, and the desirable polymerization activity observed when a haloaluminoxane of the presently claimed invention is employed. Kioka et al. does not suggest that these results are possible, and there is still nothing in Kioka et al. that suggests that any particular amount of halogen relative to aluminum in the halogenated aluminoxane is more beneficial or desirable than any other amount of halogen relative to aluminum.

The Examiner's point on Page 5 of the present Office Action that in a product-by-process claim, the product is not limited to the process, and that to overcome the rejection a difference between the product of the cited prior art and the product of the instant claims must be identified is noted. In other words, if the product is different from the prior art product, the claim to that product is patentable. As addressed above regarding the anticipation rejection, the compositions (products) of the present claims are chemically different from the prior art products of Kioka et al. This difference in composition is brought about by the way in which the products are made. Again referring to the results obtained by making Halogenated Aluminoxanes I and II of Example 31 of Kioka et al., and the comparison of the polymerization activity using Halogenated Aluminoxanes I and II with that using presently claimed compositions, the disparate results demonstrate that the products of Kioka et al. are different from the compositions of the present claims. As described above, a comparison of the portion of the ¹H NMR spectra of a fluorinated aluminoxane of the present invention and the ¹H NMR spectra for the halogenated aluminoxane of Kioka et al. made in Exhibit B

underscore the differences between the presently claimed compositions and those of Kioka et al.

It is observed that in the Table of Exhibit B below, when using the chloroaluminoxane of the present invention (5 mole % Cl:Al), the polymerization activity is about half that with the MAO control, while the chloroaluminoxanes in Table 4 of the Specification have activities slightly better than that seen with methylaluminoxane (MAO). The chloroaluminoxanes in Table 4 of the Specification were formed by chlorinating MAO with trichlorotoluene, while the chloroaluminoxane in Exhibit B was formed by chlorinating MAO with dimethylaluminum chloride. Regarding this, Applicants surmise, without wishing to be bound by theory, that there appears to be variability in at least catalytic activity depending upon the reagent used to halogenate the aluminoxane. However, rather than taking away from the present invention, this underscores the unpredictability in this art area and the nonobviousness of the present invention.

In summary, the § 103 rejection of Claims 1-13 and 15-32 over Kioka et al. should be reconsidered and withdrawn, as the presently claimed compositions are not the same as the products of Kioka et al., and there is nothing in Kioka et al. which teaches or suggests the present invention.

If any of the rejections are based on personal knowledge of the Examiner, Applicants request that the Examiner provide an affidavit explaining and supporting all personal knowledge or beliefs relied upon in forming any such rejection, pursuant to 37 C.F.R. § 1.104(d)(2), in order to give Applicants an opportunity to respond to such personal knowledge.

Finality of the Present Office Action

In the present Office Action, the reason for the finality of the Action is mischaracterized on Page 5 ("Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action."). No new grounds of rejection have been made in the present Office Action. Further, the amendments made by Applicants in responding to the immediately previous Office Action were of such a nature that the subject matter rejected in the present Office Action was claimed at the time the immediately previous Office Action was issued.

In light of the foregoing remarks, the case is still believed to be in condition for allowance. Prompt notification to this effect would be sincerely appreciated.

If any matters remain that require further consideration, the Examiner is requested to telephone the undersigned at the number given below so that such matters may be discussed, and if possible, promptly resolved.

Please continue to address all correspondence in this Application to Mr. Edgar E. Spielman, Jr. at the address of record.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Mary H. Drabnis". The signature is fluid and cursive, with the first name "Mary" being more prominent.

Mary H. Drabnis, Ph.D.

Reg. No. 45,909
Sieberth & Patty, LLC
4703 Bluebonnet Boulevard
Baton Rouge, LA 70809
Telephone: 225-291-4600
Facsimile: 225-291-4606

Exhibit B

The preparation of Halogenated Aluminoxane-I and Halogenated Aluminoxane-II of Kioka et al. in Example 31 of U.S.3,063,726 was repeated. The ethylene polymerization of Halogenated Aluminoxanes-I and -II was studied and compared with that of MAO and other haloaluminoxanes.

Syntheses

Halogenated Aluminoxane I was prepared as described in Example 31 of Kioka et al., which used the procedure of Example 24 of Kioka et al. for preparing Aluminoxane I, from dimethylaluminum chloride (46 mL) and $\text{Al}_2(\text{SO}_4)_3 \cdot 14 \text{ H}_2\text{O}$ (37 g) in toluene (125 mL). Halogenated Aluminoxane II was prepared similarly, from trimethylaluminum (24.7 mL) and dimethylaluminum chloride (25.3 mL).

A chlorinated methylaluminoxane composition was obtained by treating a toluene solution of methylaluminoxane (MAO, 20 g, 103 mmol Al) with dimethylaluminum chloride (103 mmol Cl). The slightly cloudy MAO solution became clear. The mixture was heated at 70°C for one hour and then filtered. The ratio of chlorine to aluminum in the chlorinated MAO was about 50 mole %.

A chlorinated methylaluminoxane composition of the invention (Cl-MAO) was obtained by treating a toluene solution of MAO (20 g, 103 mmol Al) with dimethylaluminum chloride (10.3 mmol Cl). The clear solution was heated and filtered. The ratio of chlorine to aluminum in the Cl-MAO was about 5 mole %.

A fluorinated methylaluminoxane composition of the invention (F-MAO) was obtained in a manner similar to that of Example 4 of the present Specification. The ratio of fluorine to aluminum in the F-MAO was 4 mole %.

Methylaluminoxane (MAO) manufactured by Albemarle was obtained from stock solutions and used as standard for comparison.

Polymerizations

Homogeneous ethylene polymerization tests were carried out in 2 L autoclave equipped with a magnetic stirrer and temperature and pressure monitors, using isohexane as solvent. The reaction temperature was maintained at 70°C, and the pressure was maintained

at 140 psig respectively for 15 minutes during polymerization. Rac-1,2-bis[indenyl]-ethylene-zirconium dichloride (2.15×10^{-6} mol) was used in all cases as the metallocene catalyst. The catalyst and the Cl-MAO solution, were added simultaneously to the autoclave, through separate inlets, followed by the introduction of high pressure ethylene gas. The reaction with F-MAO was too hot and uncontrollable, requiring a reduction of both the Al and Zr values. A metallocene amount of 1.08×10^{-6} mole was used with the F-MAO. The results are summarized in the Table below.

TABLE 4

Activator	Molar ratio Al:Zr	Zr content	Activity (g PE)
MAO	400	2.15 μ mol	50.0
Halogenated Aluminoxane-I	400	2.15 μ mol	0.0
Halogenated Aluminoxane-II	400	2.15 μ mol	0.4
Cl-MAO (50 mole % Cl:Al)	400	2.15 μ mol	2.3
Cl-MAO (5 mole % Cl:Al)	400	2.15 μ mol	23.2
F-MAO (4 mole % F:Al)	400	1.08 μ mol	52.5

¹H NMR Spectra

The ¹H NMR spectra of four of the above halogenated aluminoxanes, portions of which spectra are provided herein, are shown below. The spectra are plotted on the same scale in the region 1 to -1.5 ppm with respect to tetramethylsilane (TMS).

Spectrum I (Kioka Example 31) is for Halogenated Aluminoxane I of Example 31 of Kioka et al., which halogenated aluminoxane was made by hydrolyzing dimethylaluminum chloride. There is no characteristic fingerprint of MAO (see Spectrum III) in Spectrum I.

Spectrum II (MAO/DMAC (50)) is for the chlorinated methylaluminoxane obtained by treating methylaluminoxane with dimethylaluminum chloride, in which the ratio of chlorine to aluminum was about 50 mole %. The characteristic fingerprint of MAO has disappeared from the spectrum.

Spectrum III (MAO) is for methylaluminoxane (MAO), and shows the broad band characteristic of MAO centered at about -0.1 ppm.

Spectrum IV (F-MAO) is for the fluorinated methylaluminoxane of the present invention in which the ratio of fluorine to aluminum was about 4 mole %. The characteristic fingerprint of MAO is present in this spectrum.

Proton NMR Spectra of Haloaluminoxanes

